

REMARKS

Entry of the amendments to the specification and claims, as amended by way of Annexes to the International Preliminary Examination Report for PCT/EP2004/008777, before examination of the application in the U.S. National Phase is respectfully requested.

If there are any questions regarding this Preliminary Amendment or the application in general, a telephone call to the undersigned would be appreciated since this should expedite the prosecution of the application for all concerned.

If necessary to effect a timely response, this paper should be considered as a petition for an Extension of Time sufficient to effect a timely response, and please charge any deficiency in fees or credit any overpayments to Deposit Account No. 05-1323 (Docket # 095309.57355US).

Respectfully submitted,



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Hybrid component and associated production methodBACKGROUND AND SUMMARY OF THE INVENTION

[0001] This application claims the priority of German patent document 103 36 187.1, filed August 7, 2003 (PCT International Application No. PCT/EP2004/008777, filed August 5, 2004), the disclosure of which is expressly incorporated by reference herein.

[0002] The present invention relates to a hybrid component ~~having the features of the preamble of claim 1~~ comprising a metal body and a plastic body that is injection molded onto the metal body, and to an associated production method.

[0003] A hybrid component of this type is known, for example, from DE 100 29 411 A1 and consists of a metal body and of a plastic body injected-molded on the latter. In the known hybrid component, the plastic body serves ~~for the to connection of two metal bodies~~, the plastic body being injection-molded such that it forms an electrically insulating layer between, ~~the two metal bodies~~. The metal bodies are in this case, ~~on the one hand~~, an extruded profile and, ~~on the other hand~~, a sandwich element.

[0004] In order to protect the metallic surfaces of a hybrid component from environmental influences, in particular from corrosion, it is possible, in principle,

to provide the respective metal body with a suitable surface coating. This, however, may be relatively complicated.

[0005] For metal bodies which are produced from a coil-coated metal sheet, there is, according to DE 37 04 364 C1, the possibility of coating and sealing cut edges formed ~~occurring~~ during edging and stamping operations ~~with the aid of a lacquer curing as a result of using UV radiation cured lacquers in order thereby~~ to seal them.

[0006] Also, ~~It~~ is known from DE 40 11 320 C2 to seal cut edges of stamped, pressed, or cut plate-shaped metal parts by coating with a coating powder by means of an electrostatic powder spraying method.

[0007] However, ~~The~~ known methods for sealing cut edges of this type are comparatively complicated.

[0008] One object of t~~The present invention is concerned with the problem of indicating, for a hybrid component of the type initially mentioned, a way which makes it possible to produce cost-effectively relates~~ is to provide a cost-effective method of producing a hybrid component ~~provided~~ with surface protection.

~~This problem is solved, according to the invention, by means of the subjects of the independent claims. Advantageous embodiments are the subject matter of the dependent claims.~~

[0009] This and other objects and advantages are achieved by tThe present invention, which is based on the general idea of using a surface-coated sheet metal body for producing the hybrid component, and of modifying the injection molding of the plastic body in a controlled way, such that, ~~as a result,~~ the plastic body is molded around cut edges ~~occurring~~ formed during the production of the sheet metal body from a plate-shaped metal sheet. ~~are injection-molded around with plastic.~~ By virtue of this measure, As a result, the sealing of the cut edges is integrated into the injection molding of the plastic body.

[0010] Furthermore, ~~in~~ order to increase the stability of the sheet metal body, ~~in this case,~~ the plastic body is at the same time designed ~~as a stiffening to stiffen the metal body, with the result so that it acquires the plastic body has~~ a double function. Overall, the hybrid component can thus have the desired rigidity ~~which arises due to the stiffening of the sheet metal body with the aid of~~ by the plastic body. Moreover, ~~B~~y refining the injection molding operation ~~being refined in the way proposed according to the invention,~~ the hybrid component can be produced cost-effectively, ~~such that~~ with its metal surfaces ~~are~~ protected from harmful environmental conditions.

[0011] In an advantageous development, embodiment of the invention in the region of the uncoated edges of the sheet metal body, the plastic body may consist, ~~in the region of the uncoated edges of the sheet metal body,~~ of a plastic other than that in the remaining body. By virtue of this type of construction, the

plastics can be optimized in terms of their functions. ~~Expediently~~ For example, the plastic injection-molded onto the edges is can be selected in light of the surface protection of desired for the sheet metal body, while the plastic in the remaining plastic body is can be selected in light of the desired stiffening effect.

~~Further important features and advantages of the invention may be gathered from the subelaims, from the drawings and from the accompanying figure description with reference to the drawings.~~

~~It goes without saying that Tthe features mentioned above and those yet to be explained below may be used not only in the combination specified in each case, but also in other combinations or alone, without departing from the scope of the present invention.~~

~~Preferred exemplary embodiments of the invention are illustrated in the drawings and are explained in more detail in the following description, the same reference symbols relateing to identical or functionally identical or similar components.~~

~~In the drawings, in each case diagrammatically,~~

[0012] Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013] ~~f~~Figs 1 to 4 ~~show in each case a greatly~~ are simplified basic illustrations ~~in which show~~ a longitudinal section through a hybrid component according to the invention, in various phases of its production; ~~and~~

[0014] ~~f~~Figs 5 and 6 show ~~in each case other embodiments a view,~~ as in ~~f~~Fig. 4, ~~but in each case in other embodiments.~~

DETAILED DESCRIPTION OF THE DRAWINGS

[0015] Preferred exemplary embodiments of the invention are illustrated in the drawings and are explained in more detail in the following description, wherein the same reference symbols relateing to identical or functionally identical or similar components.

[0016] ~~According to~~ As shown in ~~f~~Fig. 4, a hybrid component 1 according to the invention comprises a metallic sheet metal body 2 and a plastic body 3 which, as ~~here shown,~~ may perfectly well also be a multipart. The sheet metal body 2 is provided with a surface coating 4 on at least one visible side, (here on both visible sides), ~~and,~~ ~~b~~By virtue of its production and/or processing, the sheet metal body 2 has uncoated edges 5 which arise during the edging of the sheet metal body 2 on its outsides and/or during the punching out of, in particular, a perforation 6. ~~and/or as a~~ Such edges may also be the result of another processing method ~~and which are correspondingly uncoated.~~

[0017] According to the invention, ~~then~~, the plastic body 3 is injected-molded onto the sheet metal body 2 such that the uncoated edges 5 are thereby sealed. That is ~~to say~~, the free edges 5 are framed by the plastic 7 of the plastic body 3.

[0018] Whereas, in the embodiment according to ~~f~~Fig. 4, the plastic body 3 is produced in a unitary manner from one and the same plastic 7, ~~f~~Fig. 5 shows a variant in which the plastic body 2 is designed as a two-component part, specifically such that, ~~in a controlled way~~, it consists, in the region of the edges 5, of a plastic 7' other than that in the remaining plastic body 3. As a result, within the plastic body 3, ~~the~~ either plastic (7 or 7') can be optimized ~~in light of~~ according to its function. For example, the plastic 7' ~~assigned to~~ formed over the edges 5 is suitable especially for ~~the~~ surface protection of the sheet metal body 2, while the plastic 7 used in the remaining plastic body 3 is selected ~~in light of~~ based on the main function of the plastic body 3. In the hybrid component 1 according to the invention, this main function is the stiffening of the sheet metal body 2. This means that the hybrid component 1 can acquires its desired rigidity and strength ~~solely~~ due to the bond between sheet metal body 2 and plastic body 3.

[0019] The hybrid component 1 may be used, for example, in motor vehicle construction, ~~For example, the hybrid component 1 may be~~ such as for trim element which is foam-backed and stiffened with the aid of the plastic body 3.

[0020] In the ~~special~~ embodiment shown in ~~f~~Fig. 5, moreover, the plastic body 3 is configured such that it completely covers one of the visible sides of the sheet metal body 2. ~~The hybrid component 1 may be used, for example, in motor vehicle construction. or example, the hybrid component 1 may be a trim element which is foam-backed and stiffened with the aid of the plastic body 3.~~

[0021] The embodiment according to ~~f~~Fig. 6 corresponds essentially to the variant from ~~f~~Fig. 4, but shows that the plastic body 3 does not have to fill the perforation 6 completely. The injection-molded plastic 7 here surrounds or seals the ~~orifice margin only, that is to say the edge 5 of the perforation 6,~~ so that, even after the injection molding of the plastic body 3, an orifice passing through the hybrid component 1 remains.

[0022] A method according to the invention for the production of the hybrid component 1 (according to the variant shown in Fig. 4) is explained in more detail below.

[0023] First, according to ~~f~~Fig. 1, the sheet metal body 2 is produced from a plate-shaped metal sheet, in particular from a coil-coated metal sheet, which is provided at least on one visible side with the surface coating 4, ~~in particular from a coil-coated metal sheet.~~ In this case, the shape desired ~~in each case~~ for the sheet metal body 2 is produced from the plate-shaped metal sheet by plastic forming, ~~and/or by edging, or cutting and/or by stamping.~~ ~~This gives rise on the sheet metal body 2 to~~ thereby forming the uncoated cut or stamped edges 5.

[0024] According to ~~f~~Fig. 2, the sheet metal body 2 produced in this way is introduced into an injection-molding die 8 which ~~in this case~~ has a lower part 9 and an upper part 10 ~~which~~ that come to bear one against the other at a parting line 11. ~~In the injection-molding die 8, t~~To produce the plastic body 3 or its parts, cavities 12 are formed in the injection-molding die 8 and ~~which~~ are connected to injection ducts 13. ~~It is clear that~~ Corresponding venting ducts (not shown) may also be provided.

[0025] According to ~~f~~Fig. 3, ~~then, according to an arrow 14,~~ the plastic 7 is injected in the direction of arrow 14 into the cavities 12 through the injection ducts 13, with the result that the plastic body 3 is formed in the cavities 12. The cavities 12 are ~~in this case~~ configured such that the injected plastic 7 can close and thereby seal the edges 5 of the sheet metal body 2.

[0026] According to ~~f~~Fig. 4, after being removed from the injection-molding die 8, the hybrid component 1 is essentially finished.

[0027] In so far as the plastic body 3 is designed as a two-component part, the plastic 7' sealing the edges 5 can be injection-molded first in a first injection-molding die. Subsequently, in a second injection-molding die, the other plastic 7 can be injection-molded in order to form the remaining plastic body 3. A variant is preferred, however, in which the two-component technology can be carried out in one and the same injection-molding die 8.

[0028] All of the above-mentioned references are herein incorporated by reference in their entirety to the same extent as if each individual reference was specifically and individually indicated to be incorporated herein by reference in its entirety.

[0029] The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed embodiments incorporating the spirit and substance of the invention may occur to persons skilled in the art, the invention should be construed to include everything within the scope of the appended claims and equivalents thereof.